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Agriculture

Animal and Plant
Health Inspection
Service

Plant Protection
and Quarantine

PESTS NOT KNOWN TO OCCUR IN THE UNITED STATES OR OF
LIMITED DISTRIBUTION

- NO. 24: RICE CUTWORM
- NO. 25: EGYPTIAN COTTONWORM
- NO. 26: MEDITERRANEAN FRUIT FLY
- NO. 27: CITRUS CANCER
- NO. 28: CITRUS BLACK SPOT
- NO. 29: SWEET ORANGE SCAB

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Preface to
Second Issue

This second APHIS 81 issue produced by the Biological Assessment Support Staff (BASS) continues the series of Pests Not Known To Occur in the United States or of Limited Distribution (PNKTO) articles. This series is intended to give facts about exotic pests as an aid to assigning priorities, in detection, control, and containment strategies and as a guide to available literature. The first 11 were published in the "Cooperative Plant Pest Report" (CPPR) which ceased publication in October 1980. Numbers 12-23 are found in the first issue in the APHIS 81 Series (APHIS 81-40 July 1982). This series had as its forerunner the "Insects Not Known To Occur in the United States" (INKTO) series published in the "Cooperative Economic Insect Report" (CEIR).

The scope and range of species treated in the PNKTO series include all plant pests and the concept of "Limited Distribution" to allow the inclusion of articles about pests that became established and subsequently eradicated to be included without concern for whether or not the species was actually exotic. This concept also includes pests that are so limited in distribution that they may be treated as though they were exotic.

Included in this issue is the third group of pests, 24 through 29. Articles will be routinely arranged to allow for as much complementing of information within the group as is practical from the range of current pest articles.

Included in this space will be comments about any new developments in connection with articles that have appeared in this series. Updates and/or corrections are typical items.

NO. 20: ORIENTAL FRUIT FLY: There is also a definitive list of hosts being created by BASS for this pest similar to the one mentioned in the article about Mediterranean fruit fly in this issue.

PESTS NOT KNOWN TO OCCUR IN THE UNITED STATES OR
OF LIMITED DISTRIBUTION, NO. 24: RICE CUTWORM

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Order: Family

Lepidoptera: Noctuidae

Pest

RICE CUTWORM
Spodoptera litura (Fabricius)

Selected
Synonyms

Common names: Cluster caterpillar, common cutworm,
cotton leafworm, tobacco cutworm, tobacco caterpillar,
tropical armyworm

Older genetic combination: Prodenia litura Fabricius

Economic
Importance

This pest is extremely polyphagous and can inflict excessive damage when occurring in masses. Similar feeding damage is caused in North America and South America by other Spodoptera species such as Spodoptera ornithogalli (Guenee). High populations can cause heavy defoliation, sometimes leaving only the bare stalks. Flower buds and green bolls may also suffer damage. S. litura is reported as a major pest of tobacco (Southeast Asia, Australia, and Japan), cotton (Australia), and has been a serious pest of mulberry (Taiwan). This cutworm damages rice annually in the Philippines, and is known to damage tomatoes in several other countries (Paddock 1977).

General
Distribution

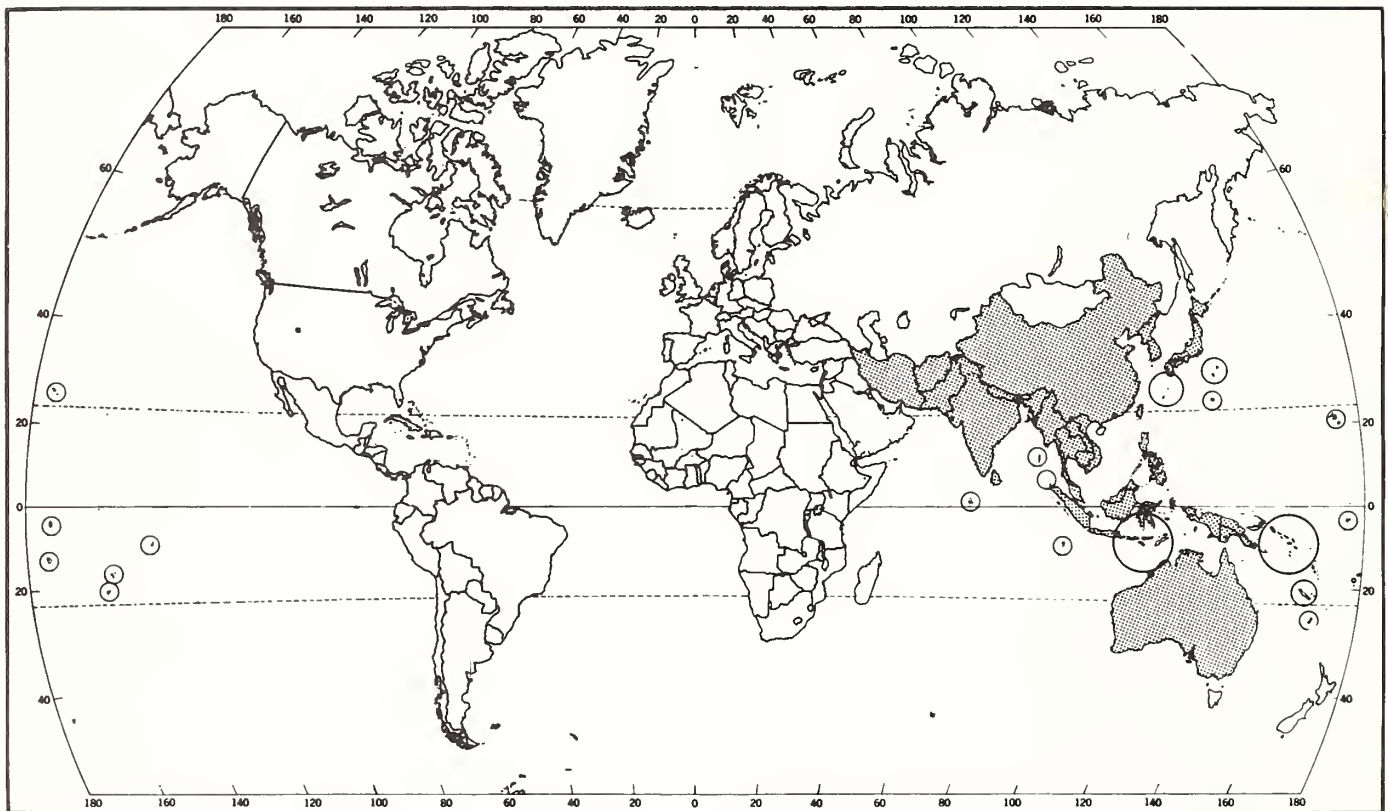
S. litura is known from Afghanistan, Andaman Islands, Australia, Bonin Islands, Burma, Cambodia, Caroline Islands, China, Christmas Island, Cocos-Keeling, Fiji, Gilbert Islands, Iran, India, Indonesia, Japan, Korea, Laos, Malaysia, Maldives Island, Mariana Islands, Marquesas Islands, Marshall Islands, Midway Island, Nepal, New Caledonia, Nicobar Islands, Norfolk Island, Pakistan, Papua New Guinea (including islands), Pearl and Hermes Reef (part of the Hawaiian Islands), Philippine Islands, Phoenix Islands, Ryukyu Islands, Sabah, Samoa, Sarawak, Sikkim, Singapore, Society Islands, Solomon Islands, Sri Lanka, Taiwan, Thailand, Tonga, Tubuai Islands, Vanuatu, Vietnam, and Wallis Islands (Commonwealth Institute of Entomology 1967, Burgess 1965, Gentry 1965).

Hosts

S. litura is polyphagous and a major pest on Gossypium barbadense (cotton), Lycopersicon esculentum (tomato), Nicotiana tabacum (tobacco), and Oryza sativa (rice).

This pest has been reported on about 103 hosts in India. Various crucifers, deciduous fruit trees, legumes, millets, flowers, and vegetable crops are other hosts.

Some of these hosts include Arachis hypogaea (peanut), Beta vulgaris (beet), Castilla elastica elastica (castilloa rubber), Citrus spp. (citrus), Cynara scolymus (globe artichoke), Erythroxylum coca (coca), Gladiolus spp. (gladiolas), Ipomoea batatas (sweet potato), Musa spp. (bananas), Ricinus communis (castorbean), Solanum tuberosum (potato), Sorghum bicolor (sorghum), Vitis spp. (grapes), and Zea mays (corn) (Santharam and others 1978, Paddock 1977, Hill 1975, Krishnaiah, Prasad, and Mohan 1975).



Spodoptera litura distribution map prepared by USDA, APHIS, PPQ, Biological Assessment Support Staff

Characters

This pest has only recently been separated from Spodoptera littoralis by the male and female genitalia of the adult moths (Mochida 1973). The larvae are not separable. The two species are allopatric in distribution.

ADULTS - Closely resemble Spodoptera ornithogalli Guenee (yellowstriped armyworm), a pest in the United States. Body whitish to yellowish, suffused with pale red. Hind wings of female darker than those of S. ornithogalli. Forewings dark brown with lighter shaded lines and stripes. Hind wings whitish with violet sheen, margin dark brown and venation brown. Thorax and abdomen orange to light brown with hairlike tufts on dorsal surface. Head clothed with tufts of light and dark brown scales. Body length 14-18 mm, wing span 28-38 mm (Hill 1975).

(Fig. 1)



Spodoptera litura: Adult female, dorsal view

EGGS - Spheroidal, somewhat flattened, sculptured with approximately 40 longitudinal ribs, 0.4 mm diameter; pearly green, turning black with time, covered with brown, hairlike scales from the female's body (Pearson 1958).

LARVAE - Newly hatched caterpillars are tiny, blackish green with distinct black band on first abdominal segment. Fully grown larvae are stout and smooth with scattered short setae. Head shiny black, and conspicuous black tubercles each with a long hair on each segment. Color of fully grown larvae not constant, but varies from dark grey to dark brown, or black, sometimes marked with yellow dorsal and lateral stripes of unequal width. The lateral

yellow stripe bordered dorsally with series of semilunar black marks. Mature larvae 40-50 mm. Two large black spots on first and eighth abdominal segments (Hill 1975).

(Fig. 2)



Larva of Spodoptera litura, lateral view

PUPAE - Reddish brown, enclosed inside rough earthen cases in soil, 18-22 mm long, last abdominal segment terminates in two hooks.

Characteristic
Damage

S. litura like S. littoralis is basically a leaf eater and sometimes acts like a cutworm with crop seedlings. S. litura feeds on the undersides of leaves causing feeding scars and skeletonizing. Initially there are numerous small feeding points which eventually spread over the entire leaf. Because of this pest's feeding activities holes and bare sections are later found on leaves, young stalks, bolls, and buds. Larvae mine into young shoots. In certain cases whole shoot tips wilt above a hole and eventually die (Hill 1975, Anonymous 1968).

Detection
Notes

1. S. litura may be detected any time the hosts are in an actively growing stage with foliage available, usually spring through fall.
2. Check for 1st and 2nd instar larvae during the day on the undersurfaces of leaves of host plants.
3. Watch for skeletonized foliage and perforated leaves. If no larvae are obvious, look in nearby hiding places. Third instar and older larvae rest in upper soil layers during the day.
4. Net sweep for adults and larvae at dawn or dusk.
5. Watch for external feeding damage to fruits.
6. Watch near lights and light trap collections for adult specimens.
7. Submit similar noctuid moths in any stage for identification (Paddock 1977).

Biology

Eggs are laid underneath leaves within 3-4 days, in clusters of 200-300. Egg production, as seen in laboratory tests, can vary from 114-890 laid in 2 or 3 batches. Temperature affects the rate of egg laying, varying from 60-70 hours at 24°C, 85-90 at 27°C, and 100-110 hours at 30°C to complete oviposition of batches of eggs. Females had the highest fecundity at 27°C (Hashmat and Khan 1977).

Hatched larvae are gregarious for a while, but later disperse. The larvae have nocturnal habits and become fully grown in about 16 days at 26°C and 14 days at 30°C. Larval development was more successful at 30°C. The growth and survival index and fecundity of the females were higher than at 26°C. Pupation takes place in the soil in an earthen cell, just below the soil surface. The adults emerge, females before males, after 6-7 days.

The life cycle takes about 30 days at 30°C and 26 days at 26°C. The number of annual generations largely depends upon the prevailing climatic conditions. Eight or more generations occur in the wet tropics. Eight to ten generations exist in the Tonking region, Vietnam (Bilapate 1979, Hill 1975, Anonymous 1968).

Natural Enemies

Parasites: In India, Chelonus heliopae Gupta (Patel and Patel 1971), and Trichogrammatoidea armigera Nagaraja (Manjunath 1972); in Taiwan, Chelonus formosanus Sonan (Rao and Patel 1974), Apanteles ruficrus (Haliday), A. plutellae Kurdjumov, Campoletis chlorideae Uchida, Charops bicolor (Szepligeti), Euplectrus sp., Meteorus sp., Microplitis pallidipes Szepligeti, M. tuberculifer (Wesmael), Snellenius manilae (Ashmead), Trichogramma dendrolimi Matsumura (Chiu and Chou 1976), and T. chilonis Ishii (Joshi, Sitaramaiah, and Ramaprasad 1980).

Predators: Eocanthecona furcellata (Wolff) (a bug) (Chu and Chu 1975), Polistes jadwigae Dalla Torre, P. chinensis (Fabricius) (papernest wasps), Labidura riparia Pallas (an earwig), Teleogryllus emma (Ohmachi and Matsumura) (a cricket), and some carabid beetles and micryphantid spiders (Nakasuji, Yamanaka, and Kiritani 1976).

Other agents: Nomuraea rileyi (Farlow) Samson is known to infect S. litura in Japan (Asayama 1979). Nuclear polyhedrosis virus (NPV) has been used successfully for control on bananas in India (Santharam and others 1978).

Bacillus thuringiensis Berliner has been shown to be effective against S. litura in the laboratory (Battu, Dilawari, and Bindra 1976).

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